

Amendments to the claims

The listing of claims below replaces all previous versions of the claims in the application.

Claims 1-47 (Canceled)

[c48] (New) A method for migrating seismic data, comprising:

- selecting an image point;
- generating a model of seismic velocity with respect to time, the model including substantially horizontal layers each having a selected velocity and a selected thickness;
- determining a two-way travel time of seismic energy from at least one seismic energy source position to at least one seismic receiver position wherein the seismic energy is reflected from the image point;
- estimating a ray path from the at least one seismic source position to the image point and from the image point to the at least one seismic receiver position, the ray path based on the source position, the receiver position and the velocity model; and
- determining the two-way travel time of seismic energy through formations to the image point.

[c49] (New) The method of claim 48 wherein the two way travel time is determined by a sixth order function of offset with respect to travel time.

[c50] (New) The method of claim 48 wherein the image point is determined by a weighted Kirchhoff integral method.

[c51] (New) The method of claim 50 further comprising correcting amplitude of the seismic energy for geometrical spreading.

[c52] (New) The method of claim 51 further comprising preserving angle dependent amplitudes.

[c53] (New) The method of claim 52 wherein a set of weights is determined for the Kirchhoff integral method using takeoff and emergence angles related to the determined ray path.

[c54] (New) The method of claim 53 wherein the weights are travel time dependent.

[c55] (New) The method of claim 48 further comprising correcting the determined two way travel time for effects of transverse isotropy with a vertical axis of symmetry in at least one of the layers forming the model.

[c56] (New) The method of claim 55 wherein the correcting comprises determining an offset midpoint travel time for the seismic energy.

[c57] (New) The method of claim 55 wherein the correcting comprises determining an anisotropy parameter.

[c58] (New) The method of claim 48 further comprising repeating the determining a two-way travel time, estimating a ray path for each of a plurality of different source positions and receiver positions for the image point.

[c59] (New) The method of claim 58 further comprising generating a common image gather from the plurality of two way travel times.